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THE VIRGINIA COLONY OF *HELIX NEMORALIS*.

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Perhaps some of your readers, when they see the long list below of varieties differing only slightly from one another, will think it a case of much ado about nothing, and wonder where the interest can be in such minute differences of color or banding.

In these days it ought to be unnecessary to apologise for going into precise detail in scientific matters, but I will venture to point out that the present case is one of quite exceptional interest.

Here we have an exceedingly variable species, whose varieties have been extensively studied in its native country—Europe, and found to differ greatly according to locality and circumstances. A few of these varieties may be traced to definite causes—most of them appear to occur causelessly, which is another way of saying that the cause is, in these cases, as yet unknown. A highly variable species, then, is introduced into a new continent, where climatic and other conditions differ markedly from those of its native home. It is certain to vary—it varies everywhere—will it not, then, be influenced in its variation by the new environment, and produce, perhaps, new and unheard-of forms? And if so, shall we not thereby have a valuable clue to the nature of these forms, and the general principles which underly the phenomena of variation in this and perhaps in other species? In the endeavor to answer these questions I shall feel excused, both now and hereafter, if I seem to go into these matters more minutely than is usual with conchological work. Myself, I believe that in the noting of minute differences

lies everywhere our best chance of ascertaining the principles of evolution.

The varieties of *Helix nemoralis* are classified according to the following principles: First, variation in the ground-color of the shell, with the name *libellula* for yellow shells, *rubella* for pink shells, *petiveria* for pale brown or fawn-colored shells, etc. Secondly, variation in the banding, for which a band-formula is used. The typical shell has five bands, three above the periphery and two below, and its formula is accordingly 12345. If a band is missing, a 0 is placed in its stead—thus 12045 has the third band of the type missing, while 00000 is the formula for a bandless shell. If two or more bands are coalesced, they are bracketed together, thus, 12(345). If a band is imperfectly developed, it is indicated as a small figure below the line, thus, 12₃45. If a band is split into two, the number is repeated, as 1233(45), while an extra band which cannot be assigned to any of the usual five, is represented by an X, as 003X00. The formula should always be taken from near the mouth of the shell. These, then, are the ordinary kinds of variation, while other unusual characters are expressed in suitable terms, as *tenuis* for a very thin variety, *compressa* for a depressed form, *minor* for a small form, *albolabiata* for a white-lipped shell, etc. These terms are used in conjunction with one another, to indicate the different peculiarities of any given shell. The band-formulæ express themselves, and need not, as a rule, have the name of their author quoted after them. But in introducing these band-varieties to the American fauna, I have given the names of their first recorders, as a hint to their history in Europe. For certain of them, I have given special names bestowed by French authors—as *brissonia* for *petiveria* 12345. If these names are to be adopted, it will be necessary to bestow many new ones, as a large number of combinations have not come under the notice of the aforesaid authors, but to my mind it is more convenient to use the band-formulæ in conjunction with the color-names. There is only one thing to be said for the names given to combinations, that if misprinted they can hardly lead to any real confusion, whereas band-formulæ may be misprinted easily enough in such a way as to lead to erroneous records, which may never be corrected.

All the shells of *H. nemoralis* I have seen from the colony at Lexington, Va., were collected by Prof. J. H. Morrison, and number altogether 103. The first consignment, sent me through Mr. H. A.

Pilsbry, was rather disappointing, in that it consisted entirely of well-known European varieties; but more recently a larger collection sent by Prof. Morrison has presented several forms of great interest, showing a general tendency to the splitting-up of the bands, as in *Helix multilineata*. The following is a list of the whole lot, with the numbers of specimens of each:

No. of Specimens.

- (1.) *libellula* 00000 = *libellula* Risso. 14.
 (2.) *libellula* (12345) = *Kleinia* Moquin-Tandon 5.
 (3.) *libellula* ₁₂345 Fenn. 1.
 (4.) *libellula* 12345 = *quinquefasciata* Moq. = the
 type 14.

(Two of these have a white rib, and thus fall also under *bimarginata* Picard.)

- (5.) *libellula* 1233(45) Chem. 1.
 (6.) *libellula* 123X45 Ckll. (X is a mere line, 4 is
 very broad) 1.
 (7.) *libellula* 123X(45) var. nov. 2.
 (8.) *libellula* 123_x(45) var. nov. 1.
 (9.) *libellula* 123₄555 var. nov. 1.
 (10.) *libellula* 12_{3xx}(45) var. nov. 1.
 (11.) *libellula* 0₂₂345 var. nov. 1.
 (12.) *libellula* 123(45) = *reaumuria* Moq. (Some
 shows the least sign of a band between
 2 and 3) 17.
 (13.) *libellula* 10345 = *argentivillea* Moq. (2 are also
 bimarginata) 11.
 (14.) *libellula* 12(345) Kreglinger 1.
 (15.) *libellula* (12)3(45) = *poiretia* Moq. 3.
 (16.) *libellula* 1233₃45 var. nov. 1.
 (17.) *libellula* 1₂₂345 var. nov. 1.
 (18.) *libellula* 10045 Kregl. = *Siounestia* Locard. 1.
 (19.) *libellula* 12₃45 v. nov. 1.

(This is new only in the sense of being unpublished. I have seen it with a pink ground-color (*rubella*) from Truro, Cornwall, England, collected by Mr. J. H. James.)

- (20.) *libellula* 00345 = *listeria* Moq. 1.
 (21.) *libellula* ₁0345 Ckll. 2.
 (22.) *libellula* 12045 = *javannea* Moq. 3.

- (23.) *libellula* 1₂345 Ckll. 1.
 (24.) *libellula* 00300 = *caviera* Moq. 1. (juv.)
 (25.) *libellula* 003(45) = *gmelina* Moq. (also *bimar-*
ginata) 1.
 (26.) *libellula* 1(23)45 = *woodia* Moq. 1.

(In this specimen bands 4 and 5 are very thick; the yellow line between 3 and 4 is very thin.)

- (27.) *rubella* 003X00 var. nov. 1. (juv.)
 (28.) *rubella* 12345 Moq. 2. (one juv.)
 (29.) *rubella* 00300 = *guettardia* Moq. 1. (pale.)
 (30.) *rubella* 00000 = *rubella* Moq. 1.
 (31.) *rubella* 0030₅ Ckll. 1.
 (32.) *petiveria* 12345 = *brissonia* Moq. 5.
 (33.) *petiveria* 123(45) = *arcelinia* Locard. (one has
 band 2 very broad) 3. (one juv.)
 (34.) *petiveria* 1(23)₃(45) v. nov. 1. (juv.)

All the above varieties have been found in Europe except Nos. 7 to 11, 16, 17, 27 and 34. The tendency of bands 4 and 5 to coalesce is notable in the series, but this is a frequent form of variation. The formula 00300, generally common in Europe, seems rare. But the most remarkable thing about the series is the splitting up of the bands in many specimens, forming combinations which I have never seen in European examples. This is perhaps to be regarded as the reverse of melanism, and due to dryness (I do not know the degree of moisture at Lexington), and it is well to remember that *H. pisana*, which frequents exceedingly dry places (sand hills, etc.), shows this splitting-up of the bands to excess. These new varieties are very diverse, and as yet few in number of specimens in the colony, which tends to show that they are of recent origin. If, as I believe, they are the direct result of the new environment, in a few years we shall see them predominate at Lexington, and probably more pronounced in their characters, not showing so many ill-developed bands. Here is a problem for the future!

Since I wrote last about this species, Prof. Morrison has sent me the following additional varieties from Lexington, Va., new to the North American Fauna:

- (1.) *libellula* 1₂345 Roebuck. (juv.)
 (2.) *libellula* 10₃45 Ckll.
 (3.) *libellula* 12₃(45) v. nov. (juv.)

- (4.) *libellula* 10045 v. nov. (two specimens.)
 (5.) *libellula* 12_{xx}345 v. nov.
 (6.) *libellula* 12X345 v. nov. (juv.)
 (7.) *libellula* 123₃45 v. nov.
 (8.) *libellula* 10300 v. nov., but also British. (juv.)
 (9.) *libellula* (123)(45) = *gronovia* Moq. In Europe, this variety is found in France, England, and Wales, and the Rev. A. Dean recently sent me examples of it from the Tyrol, and from the Pyrenees..
 (10.) *libellula* 1(23)(45) = *brardia* Moq. (juv.)
 (11.) *libellula* 1(23₃)_x(45) v. nov. (juv.)
 (12.) *libellula* 123₃45 v. nov. (juv.)
 (13.) *libellula* 000_{xxx}00 v. nov.
 (14.) *libellula* 12_{3x4}45 v. nov. (juv.)
 (15.) *libellula* 12₃(45) v. nov. (juv.)
 (16.) *libellula* (12)345 Moq. (juv.)
 (17.) *libellula* (12)X3(45) v. nov.
 (18.) *libellula* 120_{xx}45 v. nov.
 (19.) *libellula* 1_{2x}3(X4)5₅ v. nov. (juv.)
 (20.) *libellula* 12(34)5 Kregl. (juv.)
 (21.) *libellula* 02345 = *Schrateria* Moq.
 (22.) *libellula* 1030_x(5) v. nov. (juv.)
 (23.) *petiveria* 12₃45 Ckll.
 (24.) *petiveria* 12₅45 Roebuck.
 (25.) *petiveria* 1₂345 Fenn.
 (26.) *petiveria* 12045 = *Michaudia* Loc.
 (27.) *petiveria* 123445 Borchering, = var. *sexfaciata* Moq.

This remarkably variable series only emphasises the peculiarities of the previous one. There is very little variation in the ground-color of the shells.

West Cliff, Colo., Sept. 29, 1889.

COLLECTING LAND SHELLS IN SOUTHERN CALIFORNIA.

BY EDWARD W. ROPER.

“Look where you step” is a good rule to follow in any country, but it is absolutely essential in San Diego county, for two reasons. First, because it is very important, if there is a rattlesnake in your